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To: Michael Martin
California Energy Commission
Sacramento, California

Re: Docket No. 03-AAER-1
Appliance Efficiency Regulations
Refrigerated Bottled and Canned Beverage Vending Machines

Southern California Edison's Refrigeration and Thermal Test Center (RTTC) is a scientific laboratory conducting energy efficiency investigations in HVAC and refrigeration technologies. We focus on the implementation of energy efficient technologies in commercial applications. Two of our recent Codes and Standards Initiative sponsored projects involve performance evaluation of refrigerated beverage vending machines under different ambient conditions. As a result of these projects, we have learned a great deal about the operation of these machines. We would like to share our concerns regarding the ASHRAE Test Method 32.1. Additionally, we would like to leverage our test results to enhance the amendment of appliance efficiency standards (Title-20) for refrigerated bottled and canned beverage vending machines to become effective in 2006.

We agree that ASHRAE Test Method 32.1 should be used as a standard throughout the vending machine industry. However, we have encountered some problems with the test method that should be addressed. These concerns were presented to you prior to the Technical Committee 10.7 meeting at the 2004 ASHRAE summer conference in Nashville but were too late to be considered for the recent revision. Our concerns about the standard are:

1. Does not differentiate between glass-front and closed-front units.
 - a. Are the 75F/45% and 90F/65% test conditions supposed to represent indoor/outdoor environments? If so, it should be clearly stated. (EnergyStar uses the 75F/45% condition for "indoor units" and the 90F/65% condition for "outdoor units." Should a similar classification system be used here?)
 - b. Section 8.1.1 vaguely states that the unit should be tested in an environment protected from radiant heat sources. To ensure consistent test conditions, this must include room lighting as a possible radiation source especially for glass-front units.
2. Next-to-be-vended product temperatures (NTBVPT)
 - a. The definition of average NTBVPT does not make it clear as to how it should be determined. Is it instantaneous or over the whole 24-hour test period?
 - b. The Standard requires a NTBVPT swing of only $\pm 1^\circ\text{F}$ throughout the test period. Based on our test results, a glass-front machine may not be capable of meeting this

- requirement even under standard ambient conditions. The Standard should introduce a different temperature swing requirement for glass-front units.
- c. The energy consumption test specifies the “frontmost and rearmost NTB positions” (Sec. 8.2.2.1). This is confusing. There are many machines which have NTB products only on the frontal plane of the unit. We suggest that reference to frontmost and rearmost be removed and diagrams be used to show NTB positions for the different machine configurations.
 - d. Measuring each NTBPT in a machine with front- or rear-plane NTB positions would provide overly-redundant readings. The way NTBPT measurement guidelines are currently written requires 45 or more NTB locations to be monitored. These locations are often the highest temperature in the cabinet (due to their proximity to the glass) and may affect the average NTBPT swing mentioned in (b). Again, a diagram pointing out the proper representative NTBPT locations would be helpful.
3. Measurement comments
- a. Should add additional ambient temperature sensors in front of the cabinet to improve reliability (currently requires one sensor).
 - b. Location of RH measurement is not specified. Should it be the same location as the sensor for the ambient temperature (middle of unit, 12” in front)?
 - c. The unit’s maximum and average kW consumption should be reported.
 - d. The Standard refers to accuracy of the time interval but does not define the time interval itself (Sec. 5.3).
4. Misc.
- a. Energy consumption should be reported per *ounce of capacity* NOT per *unit capacity*.
 - b. The importance of section 6.1.1 (sets 12 oz. can as standard product) is unnecessary when followed by 6.1.3 (allowing an alternative).
 - c. It is our understanding that these units are built with control systems to meet EnergyStar requirements, but are not programmed until placed in the field. Manufacturers may use these sophisticated control features to show favorable performance for California Energy Commission’s (CEC) Title-20 and EnergyStar testing, but it will not be representative of actual field performance. The Standard should address potential effects of these systems.
 - d. We propose the inclusion of the EER calculations in the revised standard.

We realize that the CEC is not responsible for the test standards but feel that all interested parties should be aware of its weaknesses. It is hoped that through our research projects, the performance differences between closed-front and glass-front vending machines can be quantified. We propose that separate efficiency and energy usage requirements be applied to glass-front and closed-front units. Additionally, we believe the definition of “indoor” and “outdoor” vending machines should not be based solely on weather proofing requirements, but also by energy performance requirements.

Finally, the second phase of each of the two projects mentioned above involves the construction of prototype energy efficient closed-front and glass-front vending machines. Once construction of these units is complete, their performance will be tested in our lab following the same ambient conditions as the baseline machines. As part of this phase, we also intend to promote the use of energy efficient and demand response technologies used in the prototype vending machine units. We would like to establish a formal connection within the CEC’s Appliance Efficiency organization with whom we may regularly feed our prototype test results as they become available. It is hoped that the performance of these machines will be used to influence future vending machine energy use equations for Title-20. Information from these tests will be made available at the earliest

possible date for your consideration. We would greatly appreciate if you could review our test procedure comments. Furthermore, we would like you to closely review our vending machine test results and consider our findings to enhance energy usage requirements.

Should you have any questions, please do not hesitate to contact me.

Sincerely,

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cc: Gregg Ander (SCE)
Steve Galanter (SCE)